IN THE CLAIMS

1. (Original) A method for calibrating an imaging system having an array of detector elements arranged with respect to a reference position and having an energy source moving in a pattern to irradiate the array of detector elements, said method comprising:

initiating estimated detector positions for the array of detector elements and an estimated motion pattern for the energy source, said estimated detector positions and motion pattern being defined with respect to a reference position in the imaging system;

scanning a phantom having pins located at positions in the phantom;

calculating estimated pin positions for the pins in the phantom, with respect to the reference position, based on at least one of said estimated detector positions and motion pattern;

modifying at least one of said estimated detector positions and pin positions based on at least two of said estimated detector positions, motion pattern and pin positions;

determining variation in the motion pattern based on at least one of said estimated detector positions and pin positions; and

adjusting said motion pattern for the energy source based on said variation.

2. (Previously Presented) The method of claim 1, wherein said motion pattern comprises an arc having at least one radius, and wherein said variation comprises variation in said at least one radius of said motion pattern.

3. (Previously Presented) The method of claim 1, wherein the energy source includes a coil having a coil current that is used with the energy source to produce said motion pattern, and wherein said motion pattern comprises an arc having at least one radius, and wherein said

step of determining variation comprises determining a variation in said at least one radius of said motion pattern using said coil current over time.

4. (Previously Presented) The method of claim 1, wherein said motion pattern comprises an arc having at least one angle, wherein said variation comprises variation in said at least one angle of said motion pattern.

5. (Previously Presented) The method of claim 1, wherein the energy source includes a coil having a coil current that is used with the energy source to produce said motion pattern, wherein said motion pattern comprises an arc having at least one angle, and wherein said step of determining variation comprises determining a variation in said at least one angle of said motion pattern using said coil current over time.

6. (Previously Presented) The method of claim 1, wherein said motion pattern comprises an arc having at least one radius, wherein said adjusting step comprises adjusting said at least one radius of said motion pattern based on said variation.

7. (Previously Presented) The method of claim 1, wherein said motion pattern comprises an arc having at least one angle, wherein said adjusting step comprises adjusting said at least one angle of said motion pattern based on said variation.

8. (Previously Presented) The method of claim 1, wherein the energy source includes a coil having a dipole current that is used with the energy source to produce said motion pattern,

wherein said motion pattern comprises an arc having at least one radius, and wherein said adjusting step further comprises adjusting said at least one radius of said motion pattern based on variation of said at least one radius from a desired radial value by at least one of increasing and decreasing said dipole current of the energy beam source in proportion to the variation.

9. (Previously Presented) The method of claim 1, wherein the energy source includes a deflection coil having at least one deflection coil current that is used with the energy source to produce said motion pattern, wherein said motion pattern comprises an arc having at least one angle, and wherein said adjusting step further comprises adjusting said at least one angle of said motion pattern based on variation of said at least one angle from a desired angular value by linearly combining quanta of deflection coil currents of the deflection coil of the energy beam source to obtain a desired electron beam position at a desired time.

10. (Previously Presented) A system for calibration of an imaging system, said system comprising:

an array of detector elements arranged with respect to a reference point;

an energy source generating an electron beam to produce energy to irradiate said array of detector elements;

a coil for moving said electron beam generated by said energy source in a motion pattern, wherein said motion pattern comprises an arc including an angle and a radius;

a reconstruction system calculating estimated detector positions and estimated motion pattern of said electron beam generated by said energy source;

a radial beam correction module for correcting said at least one radius of said motion pattern of said electron beam generated by said energy source based on variation of said at least one radius from a desired radius over time; and

an angular beam adjustment module for adjusting said at least one angle of said motion pattern of said electron beam generated by said energy source based on variation of position of said motion pattern from a desired position over time.

11. (Previously Presented) A system for calibration of an imaging system, said system comprising:

an array of detector elements arranged with respect to a reference point;

an energy source generating an electron beam to produce energy to irradiate said array of detector elements;

a coil for moving said electron beam generated by said energy source in a motion pattern, wherein said motion pattern comprises an arc including an angle and a radius;

a reconstruction system calculating estimated detector positions and estimated motion pattern of said electron beam generated by said energy source;

a radial beam correction module for correcting said at least one radius of said motion pattern of said electron beam generated by said energy source based on variation of said at least one radius from a desired radius over time;

an angular beam adjustment module for adjusting said at least one angle of said motion pattern of said electron beam generated by said energy source based on variation of position of said motion pattern from a desired position over time; and

a multipin phantom used in determining at least one of said radius, said position, and said angle of said motion pattern.

12. (Previously Presented) The system of claim 10, further comprising a deflection buffer for storing deflection values from said coil over time, said deflection values used to effect at least one of variation in radius, position, and angle of said motion pattern, wherein said deflection values represent currents in said coil.

13. (Previously Presented) The system of claim 10, wherein said coil further comprises at least one of a focusing coil and a deflection coil for correcting said radius of said motion pattern of said electron beam generated by said energy source.

14. (Previously Presented) The system of claim 10, wherein said coil further comprises at least one of a focusing coil and a deflection coil for adjusting said angle of said motion pattern of said electron beam generated by said energy source.

15. (Previously Presented) The system of claim 10, wherein said reconstruction system obtains data regarding said radius and angle.

16. (Previously Presented) The system of claim 10, wherein said radial beam correction module increases or decreases a coil current applied to said coil to correct said radius of said motion pattern.

17. (Previously Presented) The system of claim 10, wherein angular beam adjustment module linearly combines quanta of coil currents in said coil at different times to adjust said angle of said motion pattern of said electron beam generated by said energy source.

18. (Previously Presented) A system for calibration of an imaging system, said system comprising:

an array of detector elements arranged with respect to a reference point;

an energy source generating an electron beam to produce energy to irradiate said array of detector elements;

a coil for moving said electron beam generated by said energy source in a motion pattern, wherein said motion pattern comprises an arc including an angle and a radius;

a reconstruction system calculating estimated detector positions and estimated motion pattern of said electron beam generated by said energy source, wherein said reconstruction system further modifies at least one of said estimated detector positions and estimated motion pattern based on at least two of said estimated detector positions, motion pattern, and positions of pins in a multipin phantom;

a radial beam correction module for correcting said at least one radius of said motion pattern of said electron beam generated by said energy source based on variation of said at least one radius from a desired radius over time; and

an angular beam adjustment module for adjusting said at least one angle of said motion pattern of said electron beam generated by said energy source based on variation of position of said motion pattern from a desired position over time.

19. (Original) The system of claim 18, wherein said reconstruction system modifies at least one of said estimated detector positions and motion pattern by computing an error vector $E = h * P$, wherein E represents an error associated with at least one of said estimated detector positions, motion pattern and pin positions, h denotes adjustments to produce more accurate estimated detector positions, motion pattern and pin positions and P represents a matrix of derivatives for detector-phantom pin samples with respect to said detector positions, motion pattern and pin positions.

20. (Withdrawn) A method for tuning an electron beam in an x-ray system, said method comprising:

correcting radial fluctuations in an electron beam based on change in radius of a beam spot of the electron beam at a plurality of time intervals; and

adjusting angular deviations in the electron beam based on change in position of the electron beam spot at a plurality of time intervals.

21. (Previously Presented) A method of tuning an electron beam in an x-ray imaging system, wherein said x-ray system includes a coil having a coil current for deflecting said electron beam, said method comprising:

measuring x-ray system geometrical parameters using a multipin phantom to obtain measured parameter values;

correcting variations between said measured parameter values and a set of desired parameter values to produce corrected parameter values; and

modifying said coil current deflecting said electron beam based on said corrected parameter values.